RT-4 USER MANUAL

The RT-4 is a battery-powered rate indicator/totalizer. Each unit has a 6 digit LCD display screen that can be programmed to read in any engineering units. The expected battery life under normal operating conditions is about 4 years.

Quite often the RT-4 is used to spot check gun, pump, valve and overall system efficiencies. When the RT-4 is used with the flow meter in this manner it is imperative to follow good flushing procedures for the flow meter. The RT-4 will only perform as well as the flow meter. After each use the flow meter must be thoroughly flushed and cleaned. If the meter will be stored for any extended period of time, we recommend that the meter be disassembled, lubricated and reassembled.

Operating Modes

There are three modes of operation for the RT-4-- total mode, flow rate mode and programming mode. Selection for the flow rate and total mode can be done by touching the MODE area of the front panel.

Total Mode

The maximum value totalized is 999999, regardless of units. There is only one totalizer selection. In order to reset the total, the total mode must be selected. The totalizer can not be accidentally reset in flow rate mode. To reset, push the reset button.

Flow Rate Mode

The rate mode is based on a selectable gate time (see Explanation of Programmed Values). By using a lower gate time the unit is more responsive. This may result in lower resolution, depending on the units selected and the flow meter.

Programming Mode

The four push buttons have the following functions:

UP button..... MODE SELECTION, UP INTEGER and MOVE DECIMAL
DN button..... RESET and DOWN INTEGER
PRG button..... ENTER PROGRAMMING
ENT button..... ENTRY

To speed integer entry, while pressing either the UP or DN button, press the PRG key. This will change the display value in increments of 250.

Explanation of Programmed Variables

There are six programmed variables for the RT-4 indicator. They are:

Pr---1 Time base in seconds (gate time) for rate measurement. This figure is based on the flow rate at 100Hz. This is the time it takes for the flow rate display to update. Pr---1 is linked to Pr---2 and Pr---3 as shown below. Before Pr---1 is programmed, Pr---2 and Pr---3 should be calculated.

Pr---2 A corrective variable for Pr---1. If the rate display update is too long, this variable can reduce the update time.

Pr---3 Decimal location for flow rate screen. Location of the decimal point will affect the Pr---1 value.

Pr---4 Front divider for the total. Only whole numbers can be inputted into this address and it is linked to Pr---5.

Pr---5 Factor for increasing resolution for totalizer.

Pr---6 Decimal location for total screen.

PROGRAMMING FLOW RATE

To enter the programming mode press the program key. The display will show *Pro*-- which indicates that the programming mode is active. In about 2 seconds the display will indicate *Pr---1* which indicates the first variable is ready to program. Pressing the up or down integer button changes the displayed value. Then press the entry button to lock the value into the Pr---1 address. Once completed the display will scroll to the Pr---2 variable and it will be ready for programming. Input the desired number and press entry and then program the required decimal point for Pr---3.

How to calculate Pr---1:

From the calibration sheet select the K-factor in the desired engineering units. Then use the following formula:

$$\frac{\text{100 imp/sec X 60 sec/min}}{\text{K-factor imp/gal}} = \text{XX gal/min}$$ This is the flow rate at 100Hz.

For Example:

You have an HPM-15 flow meter and you would like to have the flow rate read in cc/min. From the calibration sheet the average k-factor is 8.37 imp/cc.

$$\frac{\text{100 imp/sec X 60 sec/min}}{\text{8.37 imp/cc}} = 716.84 \text{ cc/min}$$

OR

You have an HPM-15 flow meter and you would like to have the flow rate read in gallons per minute. From the calibration sheet the average k-factor is 31682.6 imp/gal.

$$\frac{100 \text{imp/sec} \times 60 \text{ sec/min}}{31{,}682.6 \text{ imp/gal}} = 0.189 \text{ gal/min}$$

Pr----1 must be less that 99.99

Once the Pr---1 has been calculated, the decimal location, Pr---3 must be considered. Pr---1 has two decimal locations which you require the Pr---3 to have two decimal locations. In many cases two decimal places are undesirable. For example the HPM-15 with a Pr---1 value of 716.84 would have the following Pr---3 decimal location:

Pr---1	Pr---3
716.84	0000.00

The RT-4 would read a flow rate in cc/min with two decimal points and it would take 716.84 seconds to update the display screen. To improve on this situation simply follow this rule: **Movement of the Pr---1 decimal to the left causes a corresponding movement to the right in decimal location the of Pr---3. The reverse is true as well.**

A better solution for the above example is:

Pr---1	Pr---3
7.16	000000

Now the RT-4 reads in cc/min with no decimal location and the update time is 7.16 seconds.

Pr--2

There are five different settings:

0.....> Multiply measurement result by 1
1.....> Multiply measurement result by 2
2.....> Multiply measurement result by 4
3.....> Multiply measurement result by 8
4.....> Multiply measurement result by 16

For example: The HPM-15 reading in cc/min would have an update time of 7.16 seconds. If this response is too slow the Pr---2 can be set to 1 and then Pr---1 can be adjusted to half its value which is 3.58. The Pr---2 could be set to 2 and the Pr-1 would be reduced further to 1.79.

Pr--3

Decimal location determined when calculating Pr--1. Use DN or UP to move decimal point.

Programming the Totalizer :

From the calibration sheet you would select the average k-factor in the desired engineering unit. If that number is greater than 25 then input that whole number into the Pr---4 address.

For example: You need to totalize in gallons with the JVM-20. This meter has an average k-factor of 13164.3 imp/gal. Into the Pr---4 address you would input 13164. This would allow you to totalize in whole gallons only. To totalize with 1/10th resolution simply divide the average k-factor by 10. You would input 1316 into the Pr---4 address. Pr---6 would have one decimal place. If 1/100th resolution is require then divide the average K-factor by 100. You would input 132 into the Pr---4 address and two decimal places into Pr---6.

In both of these cases the imp/unit was greater than 25. For numbers greater than 25, Pr---5 is left in default mode which is 1. You can proceed to the Pr---6 decimal location for totalizer variable.

When the average k-factor is less than 25 the following steps should be followed.

For example: The JVM-20 has an average k-factor of 3.478 imp/cc.
Since the Pr---4 address can only accept whole numbers the choice is limited to either 3 or 4, which in either case will create a lot of error. However, the Pr---4 address is linked to the Pr---5 address which allows for a multiplier of 10 to the Pr---4 value. That will change the k-factor number to 34.78. The address variable would be 35, not 34 for the Pr---4, which has a very slight error. Once Pr---4 has been programmed, then Pr---5 would be programmed to 10. When totalizing in cc's, 1/10th place resolution is not possible.

There is one special programming case for totalization in the RT-4. This is when you wish to read in 1/10th units, but by dividing by 10 takes the average k-factor below 25.

For example: You want to totalize in ounces with the JVM-20. This meter has an average k-factor of 102.9 imp/oz. Into the Pr---4 address you would input 103. This would allow you to totalize in whole ounces only. To read to the 1/10th place divide the average k-factor by 10, which would give 10 to be inputted into Pr---4. Since this number is less than 25 we must multiply again by 10 and adjust the Pr---5 address to 10. Pr---4 would be 103. Pr---5 would be 10 and Pr---6 00000.0 and totalizing in ounces.

Pr---6 Totalizer decimal location. Simply select the desired location by pressing the up or down button, press entry and exit the programming mode.

The following chart has a list of recommended programming variables in typical engineering units for various meters. These are generic figures and are good for most applications. For those who require a higher degree of accuracy, compare the actual average k-factor from the supplied calibration sheet to the calculated data in the chart by using the formula used in the Pr---1 examples above. It also may be necessary to adjust the Pr---1 and Pr--4 variable due to differences in fluid characteristics. Simply take the percent difference from the actual value from the displayed value and adjust either variable by the difference.

To display in other Units such as liters or a time period other than minutes, or to obtain different update times (PR-1 is the display update time in seconds), contact AW Company for assistance.

Meter	**Units** (Per Minute)	**Pr--1**	**Pr--2**	**Pr--3**	**Pr--4**	**Pr--5**	**Pr--6**
HPM-15	cc	3.72	01	000000	81	10	000000
HPM-15	oz	2.48	00	00000.0	242	10	00000.0
HPM-15	gal	1.94	00	000.000	3100	01	00000.0
HPM-20	cc	3.63	02	000000	41	10	000000
HPM-20	oz	2.42	01	00000.0	124	10	00000.0
HPM-20	gal	1.89	01	000.000	1590	01	00000.0
HPM-30	oz	2.99	02	00000.0	50	01	000000
HPM-30	gal	2.34	02	000.000	639	10	0000.0
HPM-20KL	cc	3.55	02	000000	42	10	000000
HPM-20KL	oz	2.40	01	00000.0	125	10	00000.0
HPM-20KL	gal	1.88	01	000.000	1600	01	00000.0
HPM-30KL	oz	3.00	02	00000.0	50	01	000000.
HPM-30KL	gal	2.34	02	000.000	640	01	00000.0
JVM-15C	cc	3.85	01	000000	78	10	000000
JVM-15C	oz	2.56	00	00000.0	234	10	00000.0
JVM-15C	gal	2.00	00	000.000	3000	01	00000.0
JVM-20C	cc	4.27	02	000000	35	10	000000
JVM-20C	oz	2.84	01	00000.0	105	10	00000.0
JVM-20C	gal	2.22	01	000.000	1350	01	00000.0
JVX-20KL	cc	4.15	02	000000	36	10	000000
JVX-20KL	oz	2.76	01	00000.0	109	10	00000.0
JVX-20KL	gal	2.16	01	000.000	1390	01	00000.0
JVX-60KL	oz	2.05	01	000000	146	10	000000
JVX-60KL	gal	3.21	00	0000.00	187	01	00000.0
JVX-80KL	oz	4.71	02	000000	456	01	00000.0
JVX-80KL	gal	1.47	00	00000.0	408	01	000000

LIMITED WARRANTY

AW Company warrants the RT-4 Rate Indicator/Totalizer to be in good working order for a period of 1 (one) year from the date of purchase from AW Company or an authorized AW Company distributor. Should the RT-4 fail to be in good working order at any time during this 1 year warranty period, AW Company will, at its option, repair or replace the RT-4, at no additional charge except as set forth below. Repair parts and replacement products will be furnished on an exchange basis and will be reconditioned or new. All replaced parts and products become the property of AW Company. This limited warranty does not include service to repair damage to the RT-4 resulting from accident, disaster, abuse, or a Non-AW Company modification to the RT-4.

Limited warranty service may be obtained by delivering the RT-4 during the 1 year warranty period to AW Company and proof of purchase date. If this product is delivered by mail, you agree to insure the RT-4 or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty location and to use the original shipping container or equivalent.

For further information contact:

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Franksville, WI 53126
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